NINAD KALE

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EXPERIENCE

Honeywell, *Embedded Engineer II* — *Bangalore, India | Sept 2020 – Aug 2022*

Designed FOC-based speed controllers for PMSM Motors (20K RPM) used in cooling systems of airplanes. Led a research project with a 5-member team on real-time motor fault analysis. Automated manual tasks, resulting in a savings of 1000+ hrs.

- Doubled PMSM speed to 40K RPM using an optimized FOC control algorithm on a dual-core DSP architecture
- Saved significant servicing costs by predicting motor's RUL through real-time fault analysis of current signatures
- Developed drivers: GPIO, ADC, EEPROM, IPC, CAN, I2C, SPI, RS485, and a Generic Bootloader

Larsen & Toubro, *Project Liaison and Technical Lead* — *Mumbai, India | June 2019 – Aug 2020*

Built an industrial-grade underwater ROV for Indian Navy used for ship inspections. ROV is equipped with features such as wall tracking, autonomous station-keeping, and over 100-meter tethered remote control with endurance of 1hr

- End to end vehicle designing to meet specifications of endurance, depth, control, navigation & wall tracking
- Integrated full electrical system: thrusters, actuators, and sensors including DVL, IMU, Altimeter and 3DOF Arm

SKILLS

Programming : Python-*(5/5)*, C-*(5/5)*, MATLAB-*(4/5)*, Simulink-*(5/5)*, C++-*(3/5)*, ROS-*(5/5)*, PyTorch-*(4/5)*, Assembly-*(3/5)*
Embedded : F28388D DSP, ATmega328P, CCS IDE | I2C, SPI, CAN, IPC, ARINC | Bootloader, Drivers, RTOS
Robotics : Motor control, PID, Pure Pursuit, Particle Filter, Graph SLAM, Kalman filters, RRT Path Planning, VIO
AI ML : Object Detection, Face Recognition | CNNs, RNNs, LSTM, Auto encoders | PPO, DQN, TD3 | SVM, PCA, KNN

RESEARCH

F1Tenth, Autonomous Car Racing | *ICRA Paper* | *Adv : Prof Dantu* | *Video* — *Nov 2022 - Present*

Wrote software package for autonomous car racing. Researched on 2D SLAM. Participated in IROS 23' F1Tenth Competition

- Mapping : Deployed laser based 2D Cartographer and evaluated HectorSLAM & GMapping
- Localization : Developed an Particle filter with adaptive sampling, CDDT sensor modeling, and kidnap-robot mitigation
- Controls : Tested Pure Pursuit & Kinematics-Only Differential Flatness based Trajectory Tracking

University's Interactive Humanoid Assistant | *Adv : Prof Ratha* | *Video* — *Dec 2022 - Present*

Built on the Pepper platform, it answers student questions using current university websites and documents as references. It reacts to a wake word, transcribes audio, offers ChatGPT-based replies, GUI control, directions, and performs dances.

- Multi modal speaker recognition using face (ArcFace), audio (pyannote) and Clothes; Emotion & Gesture recognition
- RL based Humanoid Locomotion (Imitation Learning, DQN, PPO); Monocular Visual Odometry; ORB-SLAM2

NVIDIA: Building Transformer-Based NLP Applications Workshop — *Oct 2023*

- Built transformer architecture in PyTorch, achieving English-to-German translation with pre-trained models
- Applied NVIDIA NeMo for text classification and named-entity recognition, and deployed models with NVIDIA Triton

Fault Analysis of PMSM Motor | *Honeywell Advanced Tech Lab* | *Adv : Dr. Cheng* — *Jan 2022 - Aug 2022*

- Modeled a PMSM motor in Simulink and simulated faults such as air gap eccentricity and bearing defects
- Architected a testing setup to record and analyze current data from faulty A350 airplane's PMSM motor over serial
- Developed an algorithm for real-time FFT analysis of AC current, optimized for minimal RAM and CPU usage

Autonomous Underwater Vehicle (AUV-IITB) | *Advisor : Prof Vacchani* | *Video* — *Sept 2016 - Aug 2020*

Led a team of 55 students in developing three advanced AUVs for competitions, focusing on electrical and software components. The vehicles were designed to tackle real-world challenges such as pinger localization, buoy interaction, and torpedo handling etc.

- Integral part of the development process of AUVs for a period of four years - Matsya 6 & 5
- Circuit design, position control, and manipulation of 2DOF underwater arm. Accuracy of ± 0.5 deg

AWARDS

Honeywell : Silver Medal 22' | Bronze Medals 21' | Director's Gratitude Note for R&D initiatives, 22'
AUV-IITB : Winner National NIOT 16' & 18' | Finalist International RoboSUB 17' | Led $2 million Industrial project
IIT Bombay : Institute Technical Citation 20' | Institute Technical Special Mention 19' | Young Researcher by IEEE OES
IIT Bombay : 99.7th percentile in All India JEE Exam 16' | 99.92nd percentile in MH-CET 16' | Full tuition Scholarship

EDUCATION

University at Buffalo, Master of Science, Robotics | GPA: **3.85/4** — *Buffalo, NY | Dec 2023*

Courses *: Computer Vision, Deep Learning, Reinforcement Learning, Robotic Algorithms, Robotics I, Control Systems, Vibrations*
Paper *: Active Multi-Modal Approach for Enhanced User Recognition in Social Robots, IEEE WNYISPW Conference 23'*
Submitted for ICRA 24' *: SAGA-F1T, Surface-Adaptive Grip-Aware Trajectory Generation for F1Tenth Autonomous Racing*

Indian Institute of Technology Bombay, Bachelor of Technology, Aerospace — *Mumbai, India | Aug 2020*